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Can **Flooding** **Planted Fields** Save California Farms?

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Can Flooding Planted Fields Save California Farms?

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By Don Cameron
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WHEN I STARTED farming in 1981, the attitude was, “Drill whatever wells you need; pump whatever groundwater you need.” Back then, we were using 75- and 100-horsepower motors on our wells to get the volume of water we needed. It was just a matter of how much the power cost to pump the water. Water conservation wasn’t really on anyone’s mind because it wasn’t a big issue. It was a matter of if you could pay for it and be profitable growing. Flood and furrow irrigation were the common practices for all of our crops with only occasional drip irrigation on permanent crops.

When the King River floods, a system of pumps and canals will divert the overflow onto Terranova’s fruit and vegetable fields.

At a Glance Terranova Ranch

Owner: Diego Lissi

Vice President and General Manager:
Don Cameron

Location: Helm, CA

Vegetable crops: Peppers, carrots, garlic, onions, olives for oil, tomatoes, organic broccoli, watermelon, organic onions, and organic tomatoes

Seed crops: Conventional and organic arugula, kale, lettuce, mizuna mustard, onion, and ornamental sunflowers

Fruit crops: Wine grapes

Nut crops: Almond, walnut, and pistachio

Over time, however, I began to see that the water table was dropping at an accelerated rate. The weather and climate didn't have a lot of effect on our water level — we had flood periods and

dry periods — but we continued to see a drop in the groundwater reserves of about two feet per year.

I realized early on that this was a no-win situation. At some point, we were going to run out of water to pump.

We had a lot of water storage capacity below us. But as the water table continues to drop,

electric costs go up to support pumping the water from new depths. Today, we run 200- to 250-horsepower motors to



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get the same amount of water out of the ground. And we've had wells go dry over the last 10 to 15 years.

Finding Sustainable Solutions

I've been working on trying to find a solution for more than 25 years. We started by drilling cores to see what kind of soil structure we had and whether it would be suitable for groundwater recharge, or if we had clay layers that would prohibit recharge. For the most part, we found we could put water on the top of our soils, and it would infiltrate down to the water table.

We've learned a lot in the past 25 years, but we got serious in 2010 when David White, then Chief of the NRCS (Natural Resources Conservation Service), visited the farm to discuss the water situation here in the valley.

When we met, I told him about the idea I had to do groundwater recharge in our region. This meant taking floodwater from the north fork of the King River, which was causing flooding and property damage downstream, and diverting it onto our land to recharge the aquifer. We ended up getting a \$75,000 Conservation Innovation grant from the NRCS, and we matched it with another \$75,000 for a total of \$150,000 for our initial project.

We worked with Phil Bachand, an Engineer from the University of California, Davis, who wrote the initial grant. After the grant was accepted, we worked with Bachand to design the plan for how we were going to divert the water, get it onto our land, and measure the results of the flooding.

In the beginning of 2011, lo and behold, we had some flood water show up. It had been a dry year, so this was somewhat of



Photos: Don Cameron

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a surprise. We began our project, flooding the wine grapes and opening the ground from February until the end of May.

We had a very simple system in place to move the water, but we were able to put more than 5,000 feet of water in different fields.

We proved this concept could work for groundwater recharge here, so we began looking for additional money to scale up our project and increase the size. In 2012, we received a \$5 million Floodwater Corridor Grant from the California Department of Water Resources to take floodwater off the King River, which would prevent flooding downstream and allow for groundwater recharge. In addition, Terranova Ranch put in \$2 million in matching dollars to help fund this project.

The Commitment Needed

We had to go through environmental verification processes, engineering, permitting agreements, cultural studies, and a whole lot of red tape before we could start building the infrastructure.

Because of all the delays, our project costs went from \$7 million to somewhere between \$11 million and \$12 million. These are additional expenses that Terranova Ranch has had to fund.

In 2014, the governor signed the Groundwater Sustainability Management Act. Farmers in the area were just starting to hear about this legislation and its effects. Soon, the importance of our project became crystal clear for our neighbors. They realized that this recharge project could help keep them farming more of their ground in the future when controls might come into place on groundwater pumping.

Now they support this project wholeheartedly. But they definitely thought I was crazy when I was flooding our wine grapes for months on end back in 2011.

We began construction of phase one of the project in October 2018, and it should be completed in early 2020. Phase one encompasses our farming operation and covers about 6,000 acres. The project was designed and built to be scaled up so that it could eventually be expanded to the east and north, covering approximately 18,000 acres and including other growers in the



The project's initial phase shows permanent crops have little damage when flooded.

region. We tell people we built a four-lane highway — that is to say we oversized the project so that others could easily expand from the original phase.

Refining the Project

Looking back to the mid-1990s, we built about a mile-long canal from the King River that cost us \$25,000 and took three weeks to design and build from the time we started until the time it was done. There wasn't any permitting or complex engineering. We just did it.

For our new, larger project, we went back in and put control gates right at the river. Then we put in a large canal that travels northeast for about a mile. With the main canal in place, we're finishing up building the pumping stations, pumping units, and piping that will connect the main canal to the higher-elevation canals, which will distribute the water to the various fields to be flooded.

Basically, the infrastructure will move the water from the north fork of the King River onto and throughout the farmland so that we can then take it out of the canals, put it on the fields, and recharge the groundwater. We're also putting up berms — or small levies — around our fields to help hold the water in and allow for ponding and wildlife habitat while the water percolates into the soil.

Betting the Farm on Groundwater Recharge

I knew that flooding our grapes shouldn't kill them. Back in 1983 when the San Joaquin Valley had record flooding, I would drive along the San Joaquin River on the way to the farm each morning. I noticed in the bottom of the river channel that there was a vineyard. It had water that was probably four feet deep. The water stayed from January until the

first of August, and I watched the grapes continue to grow through the spring and early summer. Eventually, when the river receded and the grapes were harvested, the vineyard looked fine.

I stored this tidbit of information away. It came in handy when we started our project, as I knew if we were careful, we wouldn't kill the grapes. We did, however, watch them closely.

We found that in late May, when the air temperature reached above 95°F, the grapevines developed issues from the warm water temperature in the fields. Cold water holds more oxygen, so when the water warmed, the grapevine started to turn a bright yellow. We immediately stopped the floodwater and allowed the fields to dry down. Within 10 days, the vineyards were a beautiful dark green again and showed no additional symptoms. We ended up having a normal harvest and grape quality.

Since we started this initiative, we've flooded other permanent crops, including olives, almonds, pistachios, and walnuts. We experimented as we went along, and we found that you can do it with almost any crop. We've learned a lot over the years by experimenting on the farm, and I've personally gained a lot of patience for doing things that I didn't have before. I've learned that projects always seem to take longer and cost more than you expect. But as in life, all things that take time are usually worth the wait. **AVG**



Don Cameron is Vice President and General Manager of Helm, CA-based Terranova Ranch.